Precalc Warm Up # 7-1

$f(x) = \sqrt{x+5}$

$g(x) = 4 - x^2$

1. Find the domain and range of *f* and g.

2. Find f(g(x)) and g(f(x)). State the domain and range of each.

3. Find f(x) + g(x). State the domain and the range.

4. Find $f^{-1}(x)$. State the domain and range.

HW Questions:

PC A Review PC 2/SL 3,5,6

1. State the domain and range of the following relations.

a) $\{(x,y): y^2 = x, x \geq 1\}$

b) $y = \sqrt{x}, 1 \leq x \leq 25$

c) $y = \frac{4}{x+1}, x > 0$

2. Determine the implied domain for each of the following relations.

i) $y = \frac{a}{\sqrt{x-a}}, a>0$

ii) $y = \sqrt{16-x^2}$

3. Find the range of the following relations.

a) $y = \frac{ab}{x+1}, x \geq 0, ab>0$

b) $y = \frac{2a}{\sqrt{a^2-x}}, a<0$

4. A function is defined as follows, $f: x \mapsto 2x+3, x \geq 0$.

(a) Find the value of $f(0), f(1)$.

(b) Find $\{x: f(x) = 9\}$.

(c) Evaluate the expressions

i) $f(x+a)$

ii) $f(x+a)-f(x)$

5. All of the following functions are mappings of $\mathbb{R} \mapsto \mathbb{R}$ unless otherwise stated.
   (a) Determine the composite functions $(fog)(x)$ and $(gof)(x)$, if they exist
   (b) For the composite functions in (a) that do exist, find their range.

$f(x) = (x+2)^2, g(x) = x-2$ $\qquad$ $f(x) = x^3 - 2, g(x) = |x+2|$

6. Find x so that the distance between points (-2, 1) and (x, -3) is $4\sqrt{2}$.

Factoring Trinomials (a > 1)

Factor each completely.

1) $3p^2 - 2p - 5$

2) $2n^2 + 3n - 9$

3) $3n^2 - 8n + 4$

4) $5n^2 + 19n + 12$

5) $2v^2 + 11v + 5$

6) $2n^2 + 5n + 2$

7) $7a^2 + 53a + 28$

8) $9k^2 + 66k + 21$

Groups:

There are 3 consecutive even integers where the product of the smallest and the largest integer is 140. Write an equation and find the integers.

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Let x = smallest int.
$x+2$ = middle int
$x+4$ = largest int

$x(x+4) = 140$ ☆

$x^2 + 4x - 140 = 0$

$(x+14)(x-10) = 0$

$x = -14$ or 10

$-14, -12, -10$ or $10, 12, 14$

Word problem (modeling) practice
Advice:

1. First scan the problem to see what is being asked.

2. Assign variable(s), and write down what they represent.

3. Reread the problem in terms of your variables and look for relationships between them. Write an equation for each relationship. If you have more than one variable, you need more than one equation.

4. Solve equation(s). That's the easy part! Make sure you answer the question that is being asked.

Group Practice Examples:

1. The square of the difference between a number and 12 is twice the number. Find the number

Let n = number

$$(n - 12)^2 = 2n$$

$$n^2 - 24n + 144 = 2n$$

$$n^2 - 26n + 144 = 0$$

$$(n - 8)(n - 18) = 0$$

the number is either 8 or 18

Check!

2. Miles walks 24 miles every day. He always maintains a consistent speed, but if he walked 2 m/h faster, he would complete his walk one hour earlier. How fast does he usually walk?

Let x = usual speed in m/h, and t = usual time it takes in hours

Since distance = rate · time

#1: $24 = xt$

#2: $24 = (x + 2)(t - 1)$

$24 = xt - x + 2t - 2$ ← Expand #2

$24 = 24 - x + 2t - 2$ ← Substitute 24 for xt

$2 = -x + 2t$

from the first line: $t = \frac{24}{x}$

$2 = - x + 2\left(\frac{24}{x}\right)$

$2x = - x^2 + 48$

$x^2 + 2x - 48 = 0$

$(x + 8)(x - 6) = 0$

Since speed isn't negative, x = 6m/h

note: the book writes the speed as 6 mh^{-1}

"Work" problems involve situations such as two people working together to paint a house. You are usually told how long each person takes to paint a similarly-sized house alone, and you are asked how long it will take the two of them to paint the house when they work together.

There is a "trick" to doing work problems: you have to think of the problem in terms of how much each person, or machine or whatever, does *in a given unit of time*. For instance:

Suppose one painter can paint the entire house in 12 hours, and the second painter takes 8 hours. How long would it take the two painters together to paint the house?

A common mistake is to AVERAGE their times. Why does this not make sense?

Suppose one painter can paint the entire house in 12 hours, and the second painter takes 8 hours. How long would it take the two painters together to paint the house?

Let t = # hours working together.

Painter A's rate = $\frac{1}{12}$ per hour, she gets done $\frac{1}{12}t$ of the job.

Painter B's rate = $\frac{1}{8}$ per hour, he gets done is $\frac{1}{8}t$ of the job.

Together these fractions add up to 1 whole job,

so $\frac{1}{12}t + \frac{1}{8}t = 1$

$2t + 3t = 24$

$5t = 24$

$t = \frac{24}{5}$

It takes them $\frac{24}{5}$ hours working together,
or 4 hours, 48 minutes

In groups:

Lucy and Talia go trick or treating. In years past, Lucy has filled her bag of candy in 2 hours, and Talia has filled hers in 3. This year they plan to work together to fill a bag. How long will it take them working together?

Let t=time in hours it takes them to fill a bag working together.

Lucy's rate is $\frac{1}{2}$ bag per hour and
Talia's rate is $\frac{1}{3}$ bag per hour,
and they work for t hours, so

$$\frac{1}{2}t + \frac{1}{3}t = 1$$
$$3t + 2t = 6$$
$$5t = 6$$

$t = \frac{6}{5}$ of an hour, so 1 hour and 12 minutes

HW: SL Book

p. 63 #1, 2, 4, 6, 7,10,11,17

#17 is tough. Try your best but don't spend all night on it. More on "work" problems tomorrow!

Test: Thursday & Friday

Covers: PC 2 and SL 3, 5, & 6